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AUTHOR Kwartler, Trish Johnson
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ABSTRACT

The Primary Mathematics Education Enhancement Program (PMEEP) is an early childhood teacher enhancement project funded by the National Science Foundation. It is a collaborative project of Kent State University and 11 school districts in a primarily rural midwestern county that has recently been classified as Appalachia. At the conclusion of 2 years, 200 teachers from grades K-2 will have participated in workshops, kept journals, received peer coaching, and helped in a summer curriculum development project. The PMEEP model is based on the National Council of Teachers of Mathematics' "Curriculum and Evaluation Standards for School Mathematics," and reflects a constructivist approach to mathematics education that focuses on mathematical problem solving, reasoning, connections, and communication. PMEEP is designed to encourage teachers to modify the curriculum and the language they use, and to adapt its child centered "worldview" in a personally comfortable manner. The purpose of the research effort in PMEEP is to understand if the model works, and the conditions that make it effective. The study, which is currently being conducted, includes three components: (1) data collection through teacher surveys and journals; (2) case studies of four schools; and (3) microethnographies of three classrooms. This document describes the results of the microethnography for three teachers and some of the theoretical considerations behind the ethnographic portion of the study. (MDH)

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University of Pennsylvania
Center for Urban Ethnography
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Trish Johnson Kwartler
(Kent State University)
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PMEEP ▪ DOES IT CREEP INTO THE WORLDVIEW OF PARTICIPANTS ? MICROETHNOGRAPHY INQUIRY IN PROGRESS

▪ Primary Mathematics Education Enhancement Program

PMEEP : Overview

The Primary Mathematics Education Enhancement Program (PMEEP) is an early childhood teacher enhancement project funded by the National Science Foundation. The program is a collaboration of Kent State University and eleven school districts in a rural midwestern county with small urban pockets. Recently, the federal government has classified this county as Appalachia. At the conclusion of two years, 200 kindergarten through grade 2 teachers in the county will have participated in workshops, journaling, peer "coach", county consultant or professor visits, and ten days of Summer curriculum development.

This model is based upon the National Council of Teachers of Mathematics (NCTM) standards (1989) reflecting a vision of mathematical literacy requiring application of problem solving and decision making techniques, including the ability for students and teachers to work reflectively. The four standards from NCTM, mathematics as - problem solving, communication, reasoning and connections represent a departure from the way math has been experienced by most of the teachers, parents, administrators and children. The Ohio Mathematics Curriculum Model based on NCTM (1991) provides the standards for

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workshops, consultations, research, curriculum planning and implementation. The theoretical framework is often called **constructivist,** translating cognitive-developmental theory into educational practice.

The challenge is to create clear inner, mathematical logic, not the mastery of mindless rules. The National Research Council reported to the nation (1989) on the future of mathematics education.

> Education in any discipline helps students learn to think, but education also must help students to take responsibility for their thoughts. While this objective applies to all students, it is particularly apt in mathematics education because mathematics is an area in which even young children can solve a problem and have confidence that the solution is correct- not because the teacher says it, but because its inner logic is so clear.

Administrators, parents, children and county curriculum consultants are also involved during the grant term. They are perceived to be influential to the continuation of this process. As the teachers individually journal and meet with consultants, peers, or professors, the affects are subtle and possibly contradictory. A teacher may need to be reinforced in her practice as she works within existing district structuralist rules to establish/ maintain private and public esteem. The majority of teachers in this project are women. The new standards ask her to consider alternative discourses, criticism and reflection. Internalizing the new standards is potentially personally and politically radical and dangerous. Implementing change can cause disequilibrium. Many of the participants are accustomed to validating their own reality against the white male system (Schaef, 1981).

PMEEP encourages the teacher and children to validate their own reality as they negotiate mathematics in the classroom using a standard or integrated curriculum. It is anticipated that some of the women will note the exclusion of themselves in the past as they become more comfortable with mathematics. The total research effort in PMEEP is to understand if the program works, and the conditions that make it thrive. Wide ranging surveys and journals, four case study schools (served by professors) and a microethnography in two schools (3 classrooms) are the three primary layers of research. The larger study, including teacher self reports, interviews and questionnaires may find relationships between the manifest and hidden curriculum and the microethnography described below.

Microethnography:
Participants in Three Classrooms at Two Schools

Autonomous teachers do not accept uncritically curriculum models or standards. A teacher's theoretical rationale may be altered as she implements PMEEP's constructivism. For teachers to provide activities that inspire children's reasoning from instruction to construction, reinforcement to interest the case studies are attempting to look at the environments wholistically and in the context of the two communities. Koch Elementary School has students from rural and working class suburban areas in the hills overlooking a small city. Grand Elementary School is in an urban Appalachian district nestled between the hills and a major river.

After collecting data for a month the emphasis has shifted from developmental mathematics to worldview of participants in response to the innovation and standards. Teachers and children co-construct conceptions and

convictions about school and learning while experiencing mathematics. Implementation of the innovation appears to be based upon subtle practices often contradicting the formal interview data of acceptance. New questions and concerns are emerging as the teachers struggle with skepticism about lost content and more flexible discourses-practices and assessments based on teacher observation/ interaction.

Teachers are examining their individual construction of meaning as noted in the 200 journals of the larger study. I am analyzing the 100 journals from the 92-3 teachers monthly. They personally responded to in an attempt to encourage acceptance. The concept of concerns (Hall and Loucks, 1978) is the model used in this analysis as the teachers move from awareness, informational, personal, management, consequences, collaboration and refocusing. This progression would represent a modification of pedagogical worldview as a result of the implementation of constructivism. Worldview and belief systems are missing from the Hall and Loucks model. This has been added to the analysis.

Some may gradually learn to modify an ethic of caring, (Noddings, 1984) that involves becoming comfortable with respecting, consulting and giving choices to children, minimizing "teacher talk". Two of the case study teachers, Mrs. Roth and Mrs. Lewis (Koch School) are exploring these ideas in practice. The third teacher, Mrs. Eaton (Grand School) is resistant, honest and candid, "they will need to convince us, the children's skills are lower by this time of the year than any other class I ever had."

Exploring the Hidden Curriculum

Research is currently being conducted studying the ways various "actors" play out their parts in the hidden and manifest curriculum (Eisner, 1985). The cultural creation of knowledge in this social milieu is significant as it guides behavior in the two communities and three classrooms. The three teachers, Mrs. Roth and Mrs. Lewis of Koch School and Mrs. Eaton of Grand School are seen as the principal reformers.

PMEEP is designed to encourage teachers to modify the curriculum, their language, and adapt its' child centered "worldview" in a personally comfortable manner. The majority of the 100 participating teachers in the 1992-3 group have not domonstrated this generalizability in substantial ways; they have one more semester and 10 days of Summer involvement. The county consultants have mentioned further workshops needed to learn about "questioning techniques" ; this is a symptom for philosophical and theoretical approaches, I believe. The teachers prefer "Make and Take" sessions to theoretical discussions. They network for teaching ideas to solve learning problems. The *Scope and Sequence* (mostly teaching ideas) of last year's group is seen as a final and valid document, in spite of the future Summer work to edit or create another version. Contributions to the teacher newsletter have to be pleaded for, the county office is trying to encourage professional networking.

The three have voluntarily participated in school wide events, *Family Math Night* at Koch School and *100 Day Celebration* at Grand School. The administrators of both schools have encouraged collective activities and are proud of the results. Family Math Night had over 300 parents and children; most PTO meetings are poorly attended except for dramatic performances. Mrs.

Roth remarked, "I am overwhelmed." She has been teaching for over 20 years and have never seen participation about academic subject matter from the community on a large scale. The administrator at Grand School, initially suspect of the program and my research commented cheerfully to me during the noisy afternoon of 100 Day, "What have you done to my school?"

The unacknowledged seems to be more powerful than what is taught, all compelling a non reflective acceptance for what is presented, a social destiny. Both communities are old with minimal economic or commercial opportunities. The past industries are glorified, pottery, opera house, and railroading centered on the river. Newer industries are nearly non existent, major corporations unload oil at the river, the federal government is trying to build a prison and a private corporation a potentially dangerous waste treatment facility. Local resources are being stretched to oppose these new facilities, proposed to provide local employment.

Mrs. Lewis, an African American woman has been teaching for 30 years; she was able to teach in this county until after the civil rights legislation of 1965. She provides visual and social variety, the bulletin boards have red, green and black backgrounds and her communication patterns are Afrocentric. Numerous children in her class have parents that were also in "Mrs. Lewis' first grade, I know what school is like for her." Mrs. Lewis likes spontaneity, feels highly empathetic and is highly sensitive to others' nonverbal cues. Mrs. Lewis allows for alternative modes of acceptable behavior during math lessons, while still having the children search for the "right" answers to worksheets while using different manipulatives. She trusts the children with a constructivist pedagogy, but

the academic portion is traditional. Mrs. Lewis scolds, but never disciplines, it is not necessary. All three teachers use the manipulatives in non constructivist ways - as counting devices for worksheets. Their occasional use of learning centers is really small group activity directed toward specific mathematical goals. Patterning lessons and cooperative learning are periodically attempted, their relationship to mathematics is not understood at a theoretical level, teacher introductions and comments do not provoke higher level thinking.

The "hidden curriculum" fulfills a significant dimension of the schooling process. In this research it is used as an analytical tool, the issue is the implementation of mathematics standards. An early finding indicates an assumption that Mrs. Roth and Mrs. Eaton are motivated by the reproduction of local social, political and moral values.

Mrs. Lewis provides an exception to social reproduction, often calling to the class, "What's that first grade?" and the response is a happy chant from all corners and various activities. She provides an emancipatory curriculum guided by a climate of social justice while RARELY providing pure forms of constructivist mathematics in the formal curriculum. Her interpersonal style influence the hidden curriculum powerfully. Traditional seatwork is completed at the child's own pace and schedule, talking and walking is allowed, not listening during show and tell is permissible, teaching from all locations and at spontaneous moments is common, and individual tutoring done publicly is not embarrassing. Doing "hard stuff like adding and take away" is valued as one child compares himself to a new child who cannot do it. At least half of her class could be called, "at risk" but they do not display apathy, fear or

hopelessness seen so often in other settings. The girls repeatedly draw pictures of the teacher as a princess and the boys write notes to her, "You are the best teher" "I love you".

The Curriculum Maker: Who, What, When ?

The PMEEP■ grant advocates the cognitive-developmental view as a convergence of Piaget's constructivism and Dewey's progressivism (1906). This mathematics innovation is a microcosm of society. It is designed to prepare citizens for mathematical/ economic empowerment in a democracy. PMEEP participants struggle in a culture concerned with control and standardized achievement, not standards. The teacher exercises authority to "give" the powerless, the children, skills in authority, autonomy and responsibility. This "giving" is contradictory with the stated explicit curriculum/standards.

Joseph Schwab provided the image of the teacher as a deliberative curriculum maker (1960) ; this is evident in the PMEEP design and enactment with its' emphasis on all four of Schwab's commonplaces : teacher, subject matter, milieu and learner. The intentions and thoughts of the fourth commonplace, the learner, are often neglected in research; this microethnography attempts to consider the child beyond the one being acted on by the adults to achieve preconceived objectives. In the constructivist approach to curriculum and research the learner is truly the actor, therefore his/her voice and agency must be heard. This approach is designed to foster reflection, experimentation and co-operation among children. It is hoped, not assumed that the children and teachers will have a sense of self efficacy; passivity and/ or resistance have been evident by some as the study

progresses. Constructivism may not be appropriate for the passive child or resistant teacher. Over time and with positive administrative and county consultant curricular leadership, the fundamental way in which educational decisions are made by the child and the teacher (consciously or unconsciously) may become more reciprocal. The children are the sources of knowledge for planning; observation and interaction are the essential components when selecting or deselecting math standards. The participants educational worldviews will continually reshape as they trust each other to act together; they are not performing separate tasks- one teaching and the other learning. Personal worldviews lead to different strategies for defining objectives and evaluating learning.

PMEEP encourages teachers, administrators and county consultants to become more observant of student experience and development as they engage in the co-constructed, context appropriate mathematics curriculum. The emphasis is on learning and mutual adaptation of all participants contrasted with teacher directed practice. This ethnography notes subjective student experience of the curriculum. Educational experience is that which advances sustained growth in the student: dexterous thinking, and truthfulness to self. Coercion and bribery are considered a miseducative experience (Dewey, 1938). Through classroom observation/participation, interviews and collection of artifacts (e.g. slides, children's work, school memos, local newspapers, teacher and student journals, fieldnotes) patterns are emerging. The challenge to allow children to take responsibility for their OWN thoughts, a radical concept in classrooms. This study is attempting to link the underlife with the NCTM standards.

> It is reasonable to assume that ordered kinds of relations between school and classroom underlife contributes to the subjective experience of students in engaging what the school is attempting to teach... But little attempt has been made, apparently, to link research on the hidden curriculum with research on the manifest as it is enacted in instruction. (Erickson & Shultz, 1992)

During my visits, I am asking the students to engage themselves in the work of becoming more observant participants of the their own experience. The classrooms are being studied for the school year, and data is collected on student experience. The students in these classrooms are asked to meet with me weekly while "Math Journaling". The three classrooms have 100% participation; the activity is a break from routine, and the markers and journals are attractive. Questions about math concepts or non competitive, short games, are introduced and brief, individual consultations are conducted. Some of the group questions have been "How do you feel about math?" "When you think about school what picture do you see, close your eyes to see the picture." Some of the questions to the individual student during the brief consultations are, "How did you know that?" and "Would you like to tell me about that?" Personal "Math Journals" give the me access to converse with each child in small group situations. Issues of student voice of their own educational experience may have implications for the reorganization of teaching and worldview. Knowledge may be nonlinear and decision making based on ethics, and/or intuition, instead of bureaucracy.

The student experience of mathematics (possibly integrated in the curriculum) will differ qualitatively in the life cycle of the child's school career; longitudinally following selected students would make this study more complete. However, even in a single school year change will happen in the

child, the development of the curriculum, the researcher, peer coaches, administrators and PMEEP teachers. The students in the three classrooms are noted as they think and care about mathematics and school, beyond the usual doing in the classroom. As an outsider to these schools data is dependant upon insider knowledge. The voices of the insiders, particularly children, as they identify their own ends, means and capacities in learning will be central to this research.

In time it is hoped that teachers will value and contextualize some of the pedagogy introduced through the PMEEP grant. The grant makes post structural claims about creating knowledge and understanding in discourse and practice. It is not about mathematics, but about children learning mathematics in a constructivist environment. The environments are ranging from traditional teacher directed, product oriented to various levels of constructivism.

Theoretical Considerations:

"If student voices were to be more articulated, more room would need to be made for them in the ordinary conduct of classroom life". (Erickson & Shultz, 1992). Structural assumptions (e.g. prescriptive methods) which promote order and rationality pervade discourses and practices in modern life. The antihumanistic side of structuralism puts relationships among structures at the center and people at the margins (Cherryholmes, 1888); they contain arguments that subvert themselves. Teachers continue to teach structurally, standardizing test scores are low, and the teachers generally do not acknowledge their responsibility for the "problems", as they follow

unacknowledged structural ideology.

Feminist inquiry has some implications in the design of this research. It is not sufficient to provide students with knowledge considered important by privileged males, as in procedural mathematics. Feminist postmodernism gives up the pursuit of objectivity, e.g. "right answers" as the criterion for learning. Feminist epistemology, especially standpoint epistemology accepts social experience as a valuable guide and therefore increases objectivity as it is grounded in genuine situations, not distorted by the pretense of neutrality. (Noddings, 1992) The teachers are not apolitical whether they maintain the status quo or implement the curriculum.

This microethnography does not adhere to a fixed pattern of procedures, but combines ethnographic, narrative, phenomenological, narrative and action research techniques. Semi structured interviews of all teachers currently in the PMEEP program in each of the two schools, principals and county consultants are being analyzed. The same persons will be interviewed again at the conclusion of the school year. In combination with the larger scope (quantitative over 11 districts) of the county wide research, I believe that this is providing some unique data and analysis. Questions that may be answered from this interdisciplinary approach are matched with the form of inquiry that is part of this study. Demonstration of clearcut generalizations or proving a point are not the goals of this ethnography. "... generalization is process that resides in the judgement of the reader of the study ..." (Erickson and Shultz, 1992).

Readers of a well constructed case study will look to their own situation and ask, "How well does this fit our experience?" (Hamilton, 1981).

This is a description of the theories behind the microethnography portion that I am creating.

Ethnographic:

What elements influence PMEEP curriculum decision making at the student level ?

What factors in the process of PMEEP curriculum enactment improve or inhibit the teachers' abilities ?

Phenomenological:

What do the pupils, teachers, parents and administrators experience and perceive about mathematics education in general and PMEEP in particular ?

Narrative:

What stories do students tell about their experiences and perception about their mathematics education and the hidden curriculum of the classroom?

Deliberative and Action:

Should the professors, county consultants, teachers and or administrators change curriculum guidelines of PMEEP (e.g. content, organization, resource allocation) to align adult actions with appropriate goals for the child learner?

The PMEEP - grant advocates the cognitive-developmental view as a

convergence of Piaget's constructivism and Dewey's progressivism (1906). These mathematics experiences are a metaphor for the schooling in America. The manifest curriculum is designed to prepare citizens for democracy in a structure that is concerned with control and standardized achievement. When the teacher exercises authority to "give" the powerless (children) skills in authority and autonomy and responsibility it is contradictory with the stated explicit curriculum/standards. Interview and research questions have been modified as the data is continually analyzed. The approximate midpoint will be a point to ascertain categories and design changes. This is the purpose of this presentation. Please critique my design, implementation and analysis.

During Spring semester, two university professors (Swadener and Davis) and one doctoral student (Cahill) will come to the schools with me on separate dates to triangulate findings. Dr. Davis is co-director of the grant; she also provides workshops for the k-1 and Special Education teachers.

The forms of inquiry chosen influence a process designed to answer previously unanswered questions about PMEEP. Both conventional forms and newer forms of research are explained in the general literature and have basic legitimacy as forms of curriculum inquiry. It is hoped that this combination of multidisciplinary forms will develop a theory constructed from being grounded in the data.

The integrity of children and the teachers will be enhanced when they can be allowed and allow themselves to expand their perspectives in classroom discourses-practices. The mathematics standards are a vehicle to integrate this ideology into the integrated curriculum which is appropriate for adult and child learners. The case studies simultaneously analyze the k-2 students

and the three women teachers' experiences with the hidden and explicit mathematics curriculum.

> As Freud and Piaget call our attention to the differences in children's feeling and thought, enabling us to respond to children with great care and respect, so a recognition of the differences in woman's experiences and understanding expands our developmental truth.. (Gilligan, 1982)

Overhead Transparency

PMEEP: OVERVIEW

MICROETHNOGRAPHY

HIDDEN CURRICULUM

CURRICULUM MAKERS

THEORETICAL CONSIDERATIONS